ID14- EMSO-ANTARES (WESTERN LIGURIAN SEA) A UNIQUE OBSERVATORY FOR SEA SCIENCE AND PARTICLE ASTROPHYSICS

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EMSO-France is a distributed research infrastructure involving many sites of activity, one of which is the ANTARES (Astronomy with a Neutrino Telescope and Abyss environmental RESearch) site in the Western Ligurian Sea. The objective is to develop a scientific and technical observatory based on the mutualisation of effort with open access to international partners.

Based on the synergy between astroparticle physicists, focused on neutrino research, and oceanographers, geophysicists, biologists, which follow continuously the water column and the deep sea, the project aims to build a network of sensors connected in real-time to the underwater infrastructure via electro-optical cables. This multidisciplinary project, led by INSU and IN2P3, CNRS institutes, Universities of Aix-Marseille and Toulon-Var and IFREMER is also a node of the European projects KM3NeT and EMSO. This effort is supporting the science carried out within MISTRALS and the SNO MOOSE.

The ANTARES site is currently being upgraded to the next generation deep-sea neutrino telescope, named KM3NeT-ORCA (Oscillation Research with Cosmics in the Abyss). It will allow the measurement of neutrinos mass hierarchy, provide information on dark and a better knowledge of the earth deep core composition (neutrino tomography). This research infrastructure presents a unique opportunity to develop multidisciplinary projects across many different scientific fields (Fig. 1).

Building on the ANTARES experience, such as the instrumentation line and ongoing efforts aiming at instrumenting the water column for sustainable in situ a real time data acquisition, we are currently developing and diversifying our observing system (Fig.1). Furthermore, climatic changes will trigger change in temperature and other parameters that will impact on biogeochemical processes and biodiversity. It is therefore a strong necessity to setup the appropriate tools to monitor, understand our ecosystem evolution: study of the link between the surface to the deep ocean in relation with surface oceanic circulation (i.e. North current), events at the basin scale such as deep water formation, flux of organic matter and particles originating from diverse horizon, bioluminescence, nuclear radiation, seismology, monitoring deep sea fauna/flora using high-tech imaging cameras. Monitoring marine mammals through acoustic signals.

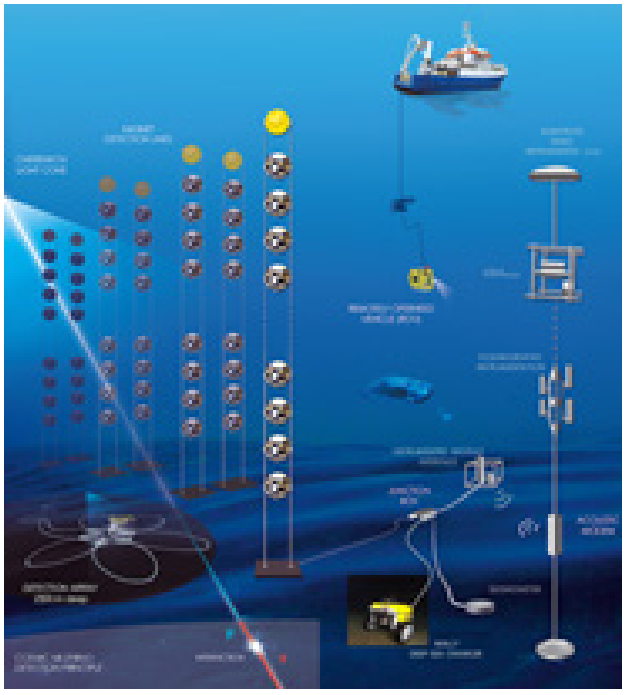

Figure 1: Artistic representation of the EMSO-KM3NeT deep-sea multidisciplinary observatory in the Western Ligurian Sea.